DATA SYSTEM IN THE INDIAN POWER SECTOR

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OBSERVATIONS/EXPLANATIONS

CEA = Central Electricity Authority

NTPC = National Thermal Power Corporation

NHPC = National Hydro-electric Power Corporation

REC = Rural Electrification Corporation

SEB = State Electricity Board

REB = Regional Electricity Board

Crore = 10 million

Lakh = 100,000 (1/10 million)

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The Indian power sector has expanded rapidly during the last three decades of planning. On the generation side, from a total installed capacity of 2300 MW in 1950, it has reached more than 30000 MW, today. This capacity consists of about 53% of thermal, 44% of hydroelectric, and 3% of nuclear capacity. There is a small but scattered capacity of diesel generating sets, a few gas turbines and some pumped storage units. Most of the power system is organised in the form of state electricity utilities, which are confined to the geographical boundaries of states (or provinces). There is an increasing network of transmission and distribution lines, with many new inter-state links of 220 KV and 400 KV. Though the per capita consumption of electricity is still low compared to global (especially developed countries') standards, the rapid rate of growth of the sector, as well as its organisational complexities, has brought in its wake numerous problems. Not the least of these is that of developing an efficient and reliable data system, with which this paper is primarily concerned.

Organisational Structure of the Power Sector

The development of a data system for the power sector, is closely linked with the nature and type of organisations using it to manage and control the sector. The organisational structure of the sector in India is partly based on historical development, and partly on legislation undertaken mainly in 1948. Under the Indian constitution, which is essentially a federal structure where states have substantial legal, financial and executive powers, electricity is on the 'concurrent list' i.e. both the central and state governments have a role to play in the growth of this sector. The autonomy of the state-level organisations is an important factor to be reckoned with in any discussion of organisations in India.

At the apex of the system is the government of India's Ministry of Energy, which has four Departments, viz. Power, Petroleum, Coal and Non-conventional Sources of Energy. The Central Electricity Authority (CEA) which is 'attached' to the Department of Power, has a statutory status under the Electricity Supply Act, 1948. The State Electricity Boards (SEBs) are also created under the same Act, with jurisdiction confined to the respective states. There are only three utilities in the private sector, Tata Electric Companies, Ahmedabad

Electric Supply Company and Calcutta Electricity Supply Undertaking. There are a few Central organisations, such as the National Thermal Power Corporation, the National Hydro-electric Power Corporation and the Rural Electrification Corporation, which also discharge some specified functions and responsibilities. The Atomic Power Authority runs the nuclear stations, but is under the administrative control of the Department of Atomic Energy. There are also a few organisations, such as the Damodar Valley Corporation and the Bhakra Beas Management Board, which are jointly owned and operated by groups of states under the (loosely knit) control of the Government of India.

The above brief summary illustrates the complexity of the organisation of the Indian power sectors. The functions of the major organisations are given in the following section.

Functions of the organisations:

Central Electricity Authority: The Central Electricity Authority is mainly an advisory board which became a full time organisation in 1951 when the former Water and Power Commission was bifurcated. Its functions are to

(a) Develop a sound and uniform national power policy and coordinate the activities of the various agencies in the power sector:

(b) Collect/record all data concerning generation, distribution and utilisation of power and to carry out studies relating to cost/efficiency, etc.;

(c) Publish from time-to-time reports and investigations in the sector;

(d) Advise State Electricity Boards and other agencies in the power sector on various technical matters, maintenance and operations;

(e) Promote and assist in the timely completion of power schemes;

(f) Promote research in all electricity generation and supply matters.

State Electricity Boards: The State Electricity Boards are autonomous public utilities but substantially under the State Government's control. More than 70% of the Power System is under, and operated by, these bodies. In major technical matters, most of the schemes of the State Electricity Boards require technical approval from the Central Electricity Authority, but they are autonomous in day-to-day operations.

Regional Electricity Boards (REBs): The Regional Electricity Boards were created in 1964 by 'Executive Orders' (i.e. they have no statutory status at present). There are five regions of contiguous states, each of which has a REB. The REBs mainly have advisory functions and are, in effect, associations of SEBs. However, they have an important role in the data system as their duties are to:

(a) Assist in integrated operations of the constitutent power systems;

(b) Prepare coordinated maintenance schedules for generating plants in the region;

(c) Draw up efficient generation schedules;

(d) Formulate pricing policy for inter-state transfer of power;

(e) Review the progress of the power development scheme.

Central Organisations:

Central organisations are slowly assuming greater importance in the power sector. The National Thermal Power Corporation (NTPC) and National Hydro-Electric Power Corporation, were established after the Electricity Supply Act was amended in 1976 to enable generation companies (other than SEB's, which are multi-functional) to be established by the Central and State Governments. The NTPC is establishing several large pithead thermal stations, the first unit of which was commissioned in February 1982. The NHPC is also engaged in setting up a few hydro-electric stations. The two organisations are also constructing 220 and 400 KV transmission lines of inter-state importance.

The Rural Electrification Corporation, established in 1969, is largely a financing organisation (advancing long-term loans to SEBs) for rural electrification projects. It is rapidly becoming the largest source of funding for the SEBs' rural electrification works, and its disbursementts crossed the Rs. 1000 crore mark nearly two years ago.

6- Complexity of Structure

The above brief account reflects the complexity of the organisational structure of the power supply industry. The major responsibility for power generation and distribution still lies with the SEBs, with the key role of controlling and advising on this development lying with the CEA. The REBs, though they do not have statutory powers, are useful intermediate level organisations in the collection and dissemination of data.

Data are needed broadly for two purposes: first, for policy-making and secondly, for 'operational' needs. Policy-making can be at the national or the state levels. Operational data relate to the 'grassroots' aspects of the power system.

However, a more useful approach to the classification of data requirements is to view it from the management aspect, and to ask the question 'what are the data needed for?'

The types of data needs in the power sector are listed and discussed in the following paragraphs:

(a) Investment Planning: A vast quantity of data is needed at the national/state levels for finalizing investment plans. These can be quite complicated, and relate to present and projected costs of equipment, fuel costs, demand forecasts etc., which form the basis of any investment plan. Recent exercises undertaken by the Central Electricity Authority in the preparation of a fifteen year-perspective power plan, have underlined the importance of these types of data. It can be easily imagined that, however sophisticated the forecasting/investment planning model used, the results would hardly command confidence if the data fed into the model are not reliable.

(b) Construction of new projects: Some of the information required under this head, is similar to that required under (a) above. However, these data are required for monitoring purposes, mainly for cost control and timely completion of projects. The Central Electricity Authority has a Monitoring Wing which collects a substantial amount of data. A significant development in the last few years has been the development of NTPC of a detailed project monitoring system which has enabled it to complete many of its major projects without slipages* .

(c) Power Systems Control: These data include various aspects of generators, transformers, circuit breakers, transmission lines etc. that would help a power system analyst to carry out various studies such as load flow, transient and dynamic stability studies etc..

(d) Technical Operation of Power Stations: This includes data on generation levels, consumption of fuels including coal, fuel oil etc., and number, type and frequency of outages, especially in thermal stations. The data in this regard are very important for performance review of thermal stations, which form the major part of the generating system. Regarding hydro stations, data regarding reservoir levels are crucial for short and medium-term generation forecasts, which are important for planning purposes.

(e) Commercial/financial data: These data are very important for management purposes. They include information on tariffs, cash flow position, arrears situation (consumer category-wise), various aspects of financial performance of the SEBs and other organisations etc..

(f) Other managerial data, such as personnel etc.: This category is of administrative importance, especially in the SEBs.

Data System

The present state of the data system will be examined in this section. The following figure** shows the linkages between the various organisations/ "information points" and the direction and mode of communication of the information between the various points.

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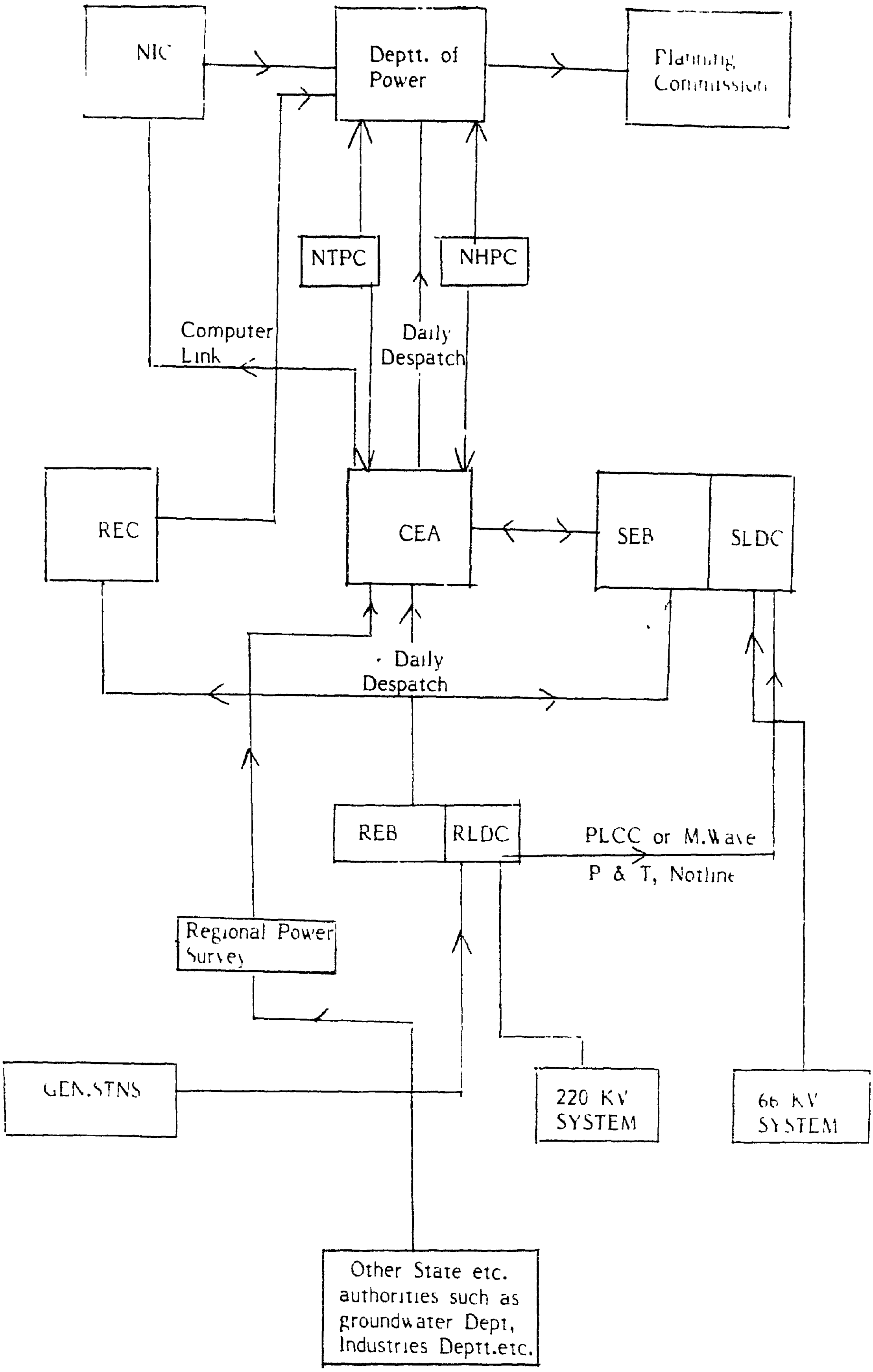
* Some illustrative formats of the NTPC's project monitoring system, are discussed in the following section.

* Adapted from D.P.Sengupta, paper presented to the International Workshop on National Energy Data Systems, Tata Energy Research Institute, New Delhi, December, 1982. (Proceedings to appear in a forthcoming book edited by Ahuja, Pachauri and Gopalakrishnan, Concept Publishing House, New Delhi, 1984.)


NIC
Deptt. of Power
Planning Commission
NTPC
NHPC
Computer Link
Daily Despatch
REC
CEA
SEB
SLDC
Daily Despatch
REB
RLDC
PLCC or M.Wave
P & T, Notline
Regional Power Survey
GEN.STNS
220 KV SYSTEM
66 KV SYSTEM
Other State etc. authorities such as groundwater Dept, Industries Deptt.etc.

It will be seen from the diagram that various 'information points' (including parts of organisations such as '220 KV system', 'generating stations' and so on) supply information to the State Load despatch centres, the Regional Load despatch centres, the SEBs, the REBs etc. Information also flows from the Regional Power Survey Office, the REBs, and SEBs to the Central Electricity Authority. The diagram also shows how the CEA is linked out only to the operating agencies but also to intermediate agencies such as the REBs, Regional Power Survey etc. and to the Government of India in the Department of Power and the Planning Commission.

There are central organisations such as the National Thermal Power Corporation (NTPC), National Hydro-electric Power Corporation (NHPC) and Rural Electrification Corporation (REC), which are important information centres in the whole system. Later in this section we propose to discuss, by way of illustration, the data system of the NTPC and the REC in some detail. These central organisations also feed data to the CEA. Apart from the fact that these two organisations have made conscious attempts to set up a sound data base with progressive computerization, there are good reasons for giving them special treatment here. The NTPC has set up a good project management and control system, as part of its efforts to set up and commission its large coal pithead-based thermal stations within the stipulated costs and time. The first few units of the NTPC have been examples of successful project management. On the operations side too, the NTPC's performance has so far been satisfactory, but what is of more interest to us is the fact that they have also tried to build up a good data system for this part of their functioning.

The Rural Electrification Corporation is a different kind of organisation from the NTPC. It is basically a financing organisation for the rural electrification projects of the SEBs. The SEBs finance part of their rural programmes from the State Government's resources, but the REC is taking over the financing of an increasing percentage of the SEBs' rural electrification programmes. On 1982-83, for instance, this was more than 50%. The total number of projects approved by the Corporation upto 31st December, 1983 was 7030; loans sanctioned were Rs.2159 crores, with 2.49 lakh new villages and 22.9 lakh pumpsets to be energized. The actual achievements have been as follows: 1.38 lakh villages electrified and 12.83 lakh pumpsets energized. The REC has, therefore, built up at its headquarters, a vast data system (based on data inflows from the SEBs) which includes (a) progress of village electrification and pumpset energisation; (b) programme-wise/districwise progress, with details of progress by special target group such as backward/tribal district etc.

The NTPC and the REC are obviously crucial institutions in the power sector. It is undeniable that improvement in the performance of the thermal sector (in the SEBs) is essential for any major improvement in the power sector as a whole; NTPC's data system (on the project management as well as operations sides) is useful to study from this point of view. REC, on the other hand, is engaged in an area of great socio-economic importance. As the SEBs' own data system is comparatively poor in many respects, a look at the REC's data system is likely to be a useful exercise.

The CEA is, thus, at the hub of this vast network, and it has a computer link with the National Informatics Centre, which processes and banks the data. Obviously, it is neither possible nor useful to enumerate exhaustively the formats on which the data are transmitted between the various information points in the system. On the other hand, it is also not helpful to discuss the data system in the abstract without referring to some of the actual formats being used. The approach adopted in this paper is to discuss the data system in the light of several illustrative formats used at various levels. These formats are given in Annexures I to XIX, and will be discussed in the following paragraphs. The extent of computerization in the Indian power sector will also be examined in this section.

Some of the communication links are also indicated in the diagram on page 12. Data on generation and power flows are continuously acquired by RLDC and SLDC, the former being linked to the 220 (and 400) KV system, and the latter only to the 66 KV system. The present modes of communication are: (a) Regular Posts and Telegraph System, and STD telephones; (b) Telex services; (c) Hotline communication system (Posts and Telegraphs), and (d) Power Line Carrier Communication (PLCC) or microwave link.

Instantaneous data are utilised for load despatch purposes. The Regional Electricity Boards utilise the instaneous/short-term data that flow to them from the generating stations and the transmission system, and prepare for the CEA: daily statements of generation, power flows between states, and hydro reservoir levels; Details of thermal station performance, including information on forced outages; monthly load flow statements, and tie line schedules and maintenance programme.

The State Electricity Boards are responsible for the bulk of the power generation in the country, and are practically the only organizations selling power to the ultimate consumers. They are, therefore, crucial links in the entire data system, and unless their capabilities in this regard are substantially improved, the data system will remain inadequate. Most of the SEBs do not use computer facilities in their data system except, for example, in billing.

They collect essential information which flows upward through the REBs and the Rural Electrification Corporation to the CEA at the national level. This information includes technical data of various winds (systems data, operations data and construction data), and commercial/ financial data. The points at which any overall analysis is done using this mass of data are basically: (1) The Central Electricity Authority (here we include the REBs, which are links of the CEA in a sense) and (2) The Rural Electrification Corporation, the apex financial body for Rural Electrification.

Discussion of Illustrative Formats

In this section, we propose to take a brief look at several formats being used at various levels, in different functional areas. These formats are reproduced in the Annexures. The idea of taking actual illustrative formats is to bring out clearly the types of data being collected, and the levels of collection, reporting and analysis. It may be emphasised here that the formats have been chosen purely for illustrative purposes here, and that the inclusion of a particular format in our list, does not mean that the other formats are less important or unnecessary.

CEA/REB/SEBs: A vast amount of data is naturally generated from the SEBs, which form the 'grassroots' of the power sector in a very significant sense. Annexures I, II, III and IV show the performance on the generation side, as received from the SEBs, and processed in the National Informatics Centre Computer for the C.E.A. As most SEBs have yet to computerise their data systems, the data systems remains largely manual till it reaches the CEA, where the process of computerisation starts. This means that there are possibilities of considerable delay up to a certain point in the process, and discussions with concerned CEA officers reveal that these possibilities are real, and that some power stations/SEBs are chronic defaulters in this regard.

It will be seen from Annexures I to IV, that system-wise, state-wise and period-wise comparisons of generation performance, are available*. Annexure I, the daily region-wise generation report, prepared at the CEA headquarters, is compiled on the basis of information from a number of power stations in the country sent through the respective SEBs. Annexure V is an example of the type of information maintained at the Regional Electricity Board; in this case, it is the Southern Regional system, with APSEB (Andhra Pradesh SEB), KSEB (Karnataka SEB), TNEB (Tamil Nadu SEB) and KEB (Kerala SEB) as the constitutents. This type of data forms the basis for interchange of power between the constituent systems, and the planning of adequate generation in the region.

Annexure VI is an example of the type of data prepared and utilised for planning purposes in the Indian power sector. It is a table taken from the 11th Annual Power Survey Report, and shows installed capacity, peak availability, peak demand, energy availability and energy requirements for the period 1975-84. The Annual Power Survey (APS) provides forecasts of energy and peak demand using a combination of past trends and 'end use' methods for many consuming sectors; for large industries with contracted demand over 1 MW each, specific information is collected through the State Governments/Central Government organisations. For electricity consumption of pumpsets, information regarding targets of achievement (which are part of the planning process) taken together with estimated consumption per set, provides the basis for forecasting energy requirements. The likely T & D losses are also taken into consideration in the forecasts. The peakload requirements are worked out from the energy forecasts, by applying assumed load factors based on past trends.

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* For reasons of space, we have included only parts of some statements e.g. Annexure II gives only a few statements.

A major part of the data system is important from what may be called the 'management' requirements of the sector. Annexure VII and VIII are good examples of this type of data. Annexure VII giives power station-wise data on planned outages (maintenance), forced outages (breakdowns), and plant load factors*.

Annexure VIII is very important, compiled from data collected from the SEBs and other authorities implementing thermal projects. This is a project wise statement**, of original and current (i.e.at the time of preparation of the statement) estimated costs, original commissioning programme and currently anticipated data of commissioning. It must be realised that this statement is the final result of a series of statements from the project monitoring meetings at organisations such as the CEA, and is very crucial in assesing the likely year-wise additions to capacity, and consequently, of power availability in different states/regions at different points of time. It is also used at higher levels of management for deciding the intervention required at different levels to expedite the implementation of projects and to reduce delays wherever possible. Similar data are collected for hydro-electric and nuclear projects.

Data system development by Rural Electrification: The REC now finances a substantial part of the rural electrification programmes in the country implemented by the State Electricity Boards. It has, since its inception in 1969, been slowly developing its data system based, of course, on information inflows from the SEBs. Since 1976, the REC has been progressively increasing computerisation of its data, initially hiring ccomputer time from outside the organisation; in 1980, the REC acquired its own inhouse mini-computer system. The following major aplications have been developed and implemented on the mini-computer: (a) Sanction position of REC schemes (b) Quarterly Progress Reporting (QPR) system (c) Loan Accounting System (d) Time series data on progress.

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* Only a few stations included in Annexure-VII.

** For reasons of space, we have included only the projects of the Northern Region in the Annexure; it must be understood that this does not mean that projects in other parts of the country are not delayed.

The REC gets information from SEBs on prescribed formats, and using its computer facilities, develops the various statements/reports. Annexures IX and XV (seven annexures) are examples of the REC statements and reports, which illustrate the kind of data collected and the type of analysis performed. It is true that the REC would not have been able to undertake many of its detailed anlayses without the aid of a computer. It has sancioned over 7000 schemes (as compared to only 1200 in 1976), and the number is increasing every year by a thousand or more. Each REC scheme is sacntioned for a period of five years (and more than five years in some cases); so the task of monitoring the financial and physical progress of the schemes in varying stages of implementation is truly colossal if attempted manually. For instance, on the accounting side, the computer goes through the 7000-odd schemes, and arrives at the amount that will be due in the next financial year on on-going schemes, for which the Corporation has to allocate specific funds. Similarly, the REC is now able to analyse the schemes on the basis of targets and achievements (consumer-category wise) in each state; this kind of comparative analysis would not have been attempted manually, though it gives valuable management information to the REC; it is also useful to policy-makers at the government level.

One significant feature of the data system in rural electrification, is the dichotomy that exists between manual functioning and computerisation. As mentioned earlier, the SEBs depend largely on manual compilation and processing of the initial data. The part that relates to REC-financed schemes, is sent up to the REC, where the computer takes over. What has been painstakingly collected and sent to the REC in several months is processed in a matter of seconds there. Statements are actually prepared about six months after the initial gathering of data starts. Discussions with REC officials reveal that, even then, some states do not send complete data. Another feature of this dichotomy is that the data of SEB-financed schemes (i.e. the non-REC part) are invariably processed manually, and the kind of comparative analysis done by REC is not available for this significant part of rural electrification operations in the country.

We shall briefly return to this subject of computerisation towards the end of this paper.

Data System development by the NTPC: We have already referred to the NTPC's data system. We present, in Annexure XVI to XIX, a few illustrations of this system. Annexures XVI and XVII are 'Site Progress Reports' relating to some aspects of the Ramagundam Super Thermal Power Project of the NTPC. Annexure XVIII is a day-by-day statement on the operations of Unit-I (210 MW) of Singrauli Super Thermal Station, which was commissioned in February 1982, for the month of January 1984. This detailed information, giving generation, availability, plant load factor, oil and auxiliary consumption, unit outages and heat rate, is very useful for management purposes. Annexure XIX is a monthwise performance summary of the same unit, from April 1982 to March 1983; it will be noticed that this statement gives some extra details such as coal consumption, fuel cost per KWh etc., which are considered more useful on a month-wise basis, but are not perhaps required on a day-to-day basis.

The NTPC is progressively computerising its data system at various levels. While the processing and analysis at headquarters is already done by computer, the organisation has plans to introduce computerisation between its various data centres i.e. the project sites and headquarters. Present plans include satellite earth stations at the four older project sites of Singrauli, Ramagundam, Korba and Farrakka, with connecting links with other project sites which are near these four, such as Rihand and Vindhyachal with Singrauli, and Kahalgaon with Farrakka; present communications through PLCC or microwave are considered much less reliable than satellite communication. Computer facilities will be available at the various sites, and the satellite communication can efficiently and reliably transmit the required data. It is understood from the NTPC that voice, data and fascimile communication needs can be met through the satellite network.

Presently, the NTPC has developed many systems in commercial and engineering areas. In the commercial area, the payroll system, financial accounting system and material accounting system have been developed, with planned expansion for inventory management etc. Examples of engineering systems developed are: cable scheduling, thermal insulations, load flow studies etc.; with planned expansion in the areas of optimal generation scheduling, engineering drawings etc.

We return once again to the point made earlier - the dichotomy developing in the Indian power sector. While central organisations such as the REC and the NTPC (as well as the CEA) are progressively modernising their data systems, the State Electricity Boards, whose operations will remain significant (in spite of the growth of the central organisations) for several years to come, are lagging behind in this regard. As they are the source of a large part of the primary data, there is need to devote some attention (and financial resources) to the strengthening of their data collection and processing facilities.

CONCLUDING REMARKS

We have examined some of the major aspects of the data system of the Indian power sector, in the preceding pages. While a very large volume of data is collected, transmitted and analysed at different levels, it appears that there is still need for considerable modifications and improvements at the various points. Some of these required improvements have been touched upon earlier in this paper. It would, however, be useful to emphasise some major aspects here. Firstly, there is an urgent need to strengthen the data-processing facilities of the State Electricity Boards. The present gap in the facilities between the SEBs and the central organisations, needs to be narrowed down. Secondly, the data collected at different levels should be re-examined carefully in order to ensure that (a) unnecessary information is not collected, and (b) even where the information is necessary, the periodicity is not more frequent than justified by the use to which it is put. There is some evidence to show that this exercise would result in reducing the data collection requirements in some areas. Thirdly, there are certain impediments to efficient and correct data collection resulting from inadequate technical arrangements, which are themselves a consequence of certain commercial policies followed by the SEBs. A notable example is unmetered power supply to agriculturists for their private tubewells/pumpsets*. In this case, the energy consumption data for tubewells are based on assumed number of hours of their working, and hence are not fully reliable. Finally, the data system in the fast-changing environment of the power sector, has to be kept under constant review.

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* i.e. where there are no energy meters, but the consumer is charged a fixed rate per H.P. of the electric motor, irrespective f the quantum of energy consumed.

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ANNEXURE - 1

DAILY GENERATION REPORT

Dated: Day:

ALL INDIA POSITION

Type of gene-	Region	Generation(Gwh)			Total capa-city (MW)*	Capa-city online (MW)*	Aggregate state peak (MW)	% of peak to total capacity	% of peak to capa-city on-line
		Today Programme	Actual	Average in this month last year					
A.Thermal	Northern								
	Western								
	Southern								
	Eastern								
	N-Eastern								
	Sub-Total								
B.Nuclear	Northern								
	Western								
	Sub-total								
C.Hydro	Northern								
	Western								
	Southern								
	Eastern								
	N-Eastern								
	Sub-Total								
A+B+C total	Northern								
	Western								
	Southern								
	Eastern								
	N-Eastern								
	Sub-Total								

Cumulative total from 1st April (Gwh)

Type of Gen.	Programme	Actual This Year	Actual Last Year
Thermal			
Nuclear			
Hydro			
Total			

DATA MISSING **REMARKS**

* This is the aggregate name plate rating of all the units/or accepted capacity.

** Outages of units of less than 20MW not considered.

ANNEXURE-II

ENERGYWISE - PERFORMANCE STATUS : ALLINDIA - REGIONWISE
PERIOD : FEB.84 VIS-A-VIS FEB. 83 AND APR 83-FEB. 84 VIS-A-VIS APR 82-FEB. 83

SL. NO.	ALL INDIA/ REGIONS	TYPE OF GENERATION	GENERATION (GWH)											PLANT LOAD FACTOR (%)			
			PROGRAM APR. 84 TO MAR. 84	FEB.					APRIL - FEB.					FEB.		APR. - FEB.	
				PROGRAM 1984	ACTUAL 1984	ACTUAL 1983	% OF PROG-RAM (6/5)	% OF LAST YEAR (6/7)	PROGRAM 1984	ACTUAL 1984	ACTUAL 1983	% OF PROG-RAM (11/10)	% OF LAST YEAR (11/12)	1984	1983	1984	1983
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
I.	ALL INDIA																
		THERMAL	91825	8007	7731	6831	96.6	113.2	82968	77664	71739	93.6	108.3	51.6	52.5	47.2	48.8
		NUCLEAR	3500	351	290	84	82.6	345.2	3191	3197	1827	100.2	175.0	33.6	14.5	41.2	26.5
		HYDRO	49000	3550	3742	3058	105.4	122.4	45292	45819	44807	101.2	102.3	39.7	36.4	43.3	45.5
		TOTAL	144325	11908	11763	9973	98.8	117.9	131451	126680	118373	96.4	107.0	46.7	45.3	45.6	46.9
II.	REGIONS																
1.	NORTHERN																
		THERMAL	21000	1753	1836	1505	104.7	122.0	18973	17282	15394	91.1	112.3	48.7	45.8	41.5	42.1
		NUCLEAR	1580	171	102	25	59.6	408.0	1391	1091	472	78.4	231.1	33.3	8.5	30.8	13.4
		HYDRO	18259	1150	1173	1105	102.0	106.2	16891	17709	17292	104.8	102.4	35.4	38.5	48.7	51.0
		TOTAL	40839	3074	3111	2635	101.2	118.1	37255	36082	33158	96.9	105.8	42.1	40.7	44.2	44.8
.	WESTERN																
		THERMAL	39050	3442	3186	2951	92.6	108.0	35235	32832	29612	93.2	110.9	56.5	62.5	54.2	55.4
		NUCLEAR	1920	180	99	59	55.0	167.8	1800	1760	1355	97.8	129.9	33.9	20.9	52.1	40.2
		HYDRO	5920	493	729	454	147.9	160.6	5420	6866	5836	126.7	117.6	60.9	39.3	49.7	42.4
		TOTAL	46890	4115	4014	3464	97.5	115.9	42455	41458	36803	97.7	112.6	56.3	56.2	53.3	52.1
3.	SOUTHERN																
		THERMAL	13900	1269	1264	1173	99.6	107.8	12538	12465	12033	99.4	103.6	57.4	57.9	51.5	52.2
		NUCLEAR	0	0	89	0			0	345	0						
		HYDRO	21874	1649	1538	1284	93.3	119.8	20303	18100	19109	89.1	94.7	37.6	35.1	39.1	45.1
		TOTAL	35774	2918	2891	2457	99.1	117.7	32841	30912	31142	94.1	99.3	44.3	43.2	43.3	47.6
4.	EASTERN																
		THERMAL	16850	1462	1368	1154	93.6	118.5	15284	14210	13886	93.0	102.3	44.0	41.0	40.2	43.6
		HYDRO	2347	218	268	186	122.9	144.1	2123	2657	2140	125.2	124.2	41.1	29.8	35.4	28.7
		TOTAL	19197	1680	1636	1340	97.4	122.1	17407	16867	16026	96.9	105.2	43.5	39.0	39.3	40.7
5.	N.EASTERN																
		THERMAL	1025	81	77	48	95.1	160.4	938	874	814	93.2	107.4	33.8	20.0	33.7	37.2
		HYDRO	600	40	34	29	85.0	117.2	555	487	430	87.7	113.3	19.9	31.6	26.6	39.2
		TOTAL	1625	121	111	77	91.7	144.2	1493	1361	1244	91.2	109.4	27.8	24.1	30.8	37.9

ENERGYWISE - PERFORMANCE STATUS : ALLINDIA - STATEWISE/SYSTEMWISE
PERIOD : FEB.84 VIS-A-VIS FEB. 83 AND APR 83-FEB. 84 VIS-A-VIS APR 82-FEB. 83

1. STATES/ SYSTEMS	TYPE OF GENERATION	GENERATION (GWH)											PLANT LOAD FACTOR (%)			
		PROGRAM APR. 84 TO MAR. 84	FEB.					APRIL - FEB.					FEB.		APR. - FEB.	
			PROGRAM 1984	ACTUAL 1984	ACTUAL 1983	% OF PROG-RAM (6/5)	% OF LAST YEAR (6/7)	PROGRAM 83-84	ACTUAL 83-84	ACTUAL 82-83	% OF PROG-RAM (11/10)	% OF LAST YEAR (11/12)	1984	1983	83-84	82-83
1 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. NORTHERN REGION																
1. B.B.M.B.																
	HYDRO	10550	689	691	664	100.3	104.1	9783	10466	10159	107.0	103.0	38.9	45.5	54.4	59.4
2. DELHI																
BADARPUR		3475	280	320	268	114.3	119.4	3185	2750	2714	86.3	101.3	63.9	55.4	47.5	47.6
D.E.S.U.		1475	131	109	105	83.2	103.8	1333	1191	1271	89.3	93.7	50.4	50.3	47.7	51.1
DELHI TOTAL		4950	411	429	373	104.4	115.0	4518	3941	3985	87.2	98.9	59.8	53.9	47.6	48.7
3. J. & K.																
	THERMAL	10	0	1	1		100.0	10	3	2	30.0	150.0	6.4	6.6	1.7	1.1
	HYDRO	842	43	39	50	90.7	78.0	795	822	824	103.4	99.8	32.2	42.5	58.8	58.7
	TOTAL	852	43	40	51	93.0	78.4	805	825	826	102.5	99.9	29.2	38.4	52.2	52.2
4. H. P.																
H.P.S.E.B. HYDRO		600	26	20	24	76.9	83.3	553	540	475	97.6	113.7	23.9	29.8	56.0	49.4
NHPC(BAIRASIUL)		920	40	16	30	40.0	53.3	810	793	719	97.9	110.3	12.8	24.8	54.8	49.8
H.P. TOTAL HYDRO		1520	66	36	54	54.5	66.7	1363	1333	1194	97.8	111.6	17.2	26.8	55.3	49.7
5. HARYANA																
	THERMAL	1450	137	131	107	95.6	122.4	1313	986	1008	75.1	97.8	45.4	37.9	29.6	24.4
. RAJASTHAN																
R.S.E.B.																
	THERMAL	375	46	102	0	221.7		317	566	5	178.5		66.6		72.2	
	HYDRO	515	49	79	65	161.2	121.5	480	583	590	121.5	98.8	41.9	35.7	26.8	27.2
	TOTAL	890	95	181	65	190.5	278.5	797	1149	595	144.2	193.1	33.0	35.7	34.9	27.2

ANNEXURE - IV

CENTRAL ELECTRICITY AUTHORITY
GENERATION DATA COLLECTION DIRECTORATE
ENERGY GENERATION, PROGRAMME AND PLANT LOAD FACTOR : AN OVERVIEW

PERIOD : FEB., 1984
DATE : 27-03-84

I. ALL INDIA : MONTHLY AS ALSO CUMULATIVE

SL. NO.	ALL INDIA	TYPE OF GENERATION	GENERATION (GWH)											PLANT LOAD FACTOR (%)			
			PROGRAM APR. 84 TO MAR. 84	FEB.					APRIL - FEB.					FEB.		APR. - FEB.	
				PROGRAM 1984	ACTUAL 1984	ACTUAL 1983	% OF PROG-RAM (6/5)	% OF LAST YEAR (6/7)	PROGRAM 83-84	ACTUAL 83-84	ACTUAL 82-83	% OF PROG-RAM (11/10)	% OF LAST YEAR (11/12)	1984	1983	83-84	82-83
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	ALL INDIA	THERMAL	91825	8007	7731	6831	96.6	113.2	82968	77664	71739	93.6	108.3	51.6	52.5	47.2	48.9
		NUCLEAR	3500	351	290	84	82.6	345.2	3191	3197	1827	100.2	175.0	33.6	14.5	41.2	26.5
		HYDRO	49000	3550	3742	3058	105.4	122.4	45292	45819	44807	101.2	102.3	39.7	36.4	43.3	45.5
		TOTAL	144325	11908	11763	9973	96.8	117.9	131451	126680	118373	96.4	107.0	46.7	45.3	45.6	46.9

REPORT PREPARED THROUGH A
COMPUTER BASED SYSTEM DEVELOPED BY
THE COMPUTER SERVICES DIRECTORATE,
CENTRAL ELECTRICITY AUTHORITY.

NNEXURE - V

SOUTHERN REGIONAL GRID SYSTEM
HALF HOURLY ANTICIPATED LOAD DEMANDS EXPORT/IMPORT AND GENERATION TO BE MAINTAINED IN THE CONSTITUENT SYSTEMS ON A TYPICAL WORKING DAY IN

TIME	A P S E B						KSEB	TNEB	KEB
	Anticipated load demand	EXPORT (+) OR IMPORT (+)				Generation to be maintained			
		KEB	TNEB	ORISSA					
				+	-				
0.00									
0.30									
1.00									
1.30									
2.00									
2.30									
21.00									
21.30									
23.30									

NNEXURE - VI

INSTALLED CAPACITY, PEAK AVAILABILITY, PEAK LOAD, ENERGY AVAILABILITY AND ENERGY REQUIREMENT

	ACTUAL			PROVISIONAL			ESTIMATED		
	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Installed Capacity MW	20106	21463	23673	26680	28458	30294	33489	38008	43348
Peak availability MW	13452	14197	15097	17027	17402	19188	21142	223976	27401
Peak Load MW	13452*	14197*	15097*	17027*	17402*	19188*	25190	27712	30372
Surplus (Deficit) MW	-	-	-	-	-	(4048)	(3736)	(2971)	
Energy Availability Mkwh	74777	83061	85789	96654	98837	104134	127522	142167	161411
Energy Requirement Mkwh	74777*	83061*	85789*	96654*	98837*	104134*	139873	153921	168415
Surplus (Deficit) Mkwh	-	-	-	-	-	-	(12351)	(11754)	(7004)

*Restricted

NNEXURE - VII

DATA ON LOSS OF GENERATION FORCED AND PLANNED OUTAGES-PLANT LOAD FACTOR (PLF) 1980-1981

	P.L.F.	Partial loss and low load	Planned outage	Forced outage
	Expressed in percentage			
NORTHERN REGION				
Renu Sagar	86	7	7	-
I.P.Station	60	15	10	15
Panki	55	10	22	8
Panki Extension	47	21	10	22
Badarpur	46	24	77	23
Obra (T)	46	15	11	28
Obra Extension II	40	21	11	20
Bhatinda	38	21	11	30
Obra Extension II	38	22	15	25
Panipat	33	28	2	37
Hardua Ganje	34	13	53	-
Hardua Ganj B	32	17	13	38
Faridabad	29	12	16	43
Hardua Ganj A	3	2	95	-

ANNEXURE - VIII

STATEMENT INDICATING THERMAL PROJECTS UNDER CONSTRUCTION IN THE COUNTRY SHOWING ORIGINAL AND REVISED ESTIMATED COST AND ORIGINAL AND ANTICIPATED DATE OF COMMISSIONING.

Sl. No.	Name of the Project	Capacity (MW)	Estimated Cost (Rs. in lakhs)		Original Commissioning programme	Anticipated date of Commissioning
			Original	Revised		
1.	2	3	4	5	6	7
NORTHERN REGION						
1.	HARYANA					
	1. Panipat St.II (Unit 3 and 4)	2x110	7293	11850	Unit-3 9/82 Unit-4 3/83	4/84 12/84
	2. Panipat St.III (Unit 5)	1x210	11110	Not yet revised	Unit-5 12/84	12/85
II.	PUNJAB					
	1. Ropar (Unit 1 and 2)	2x210	16800	32738	Unit-1 5/84 Unit-2 11/84	9/84 6/85
III.	RAJASTHAN					
	1. Kota (Unit 1 and 2)	2x110	8160	14304	Unit-1 3/81 Unit-2 9/81	6/82 12/82
	2. Kota St.II (Unit 3 and 4)	2x210	13378	23000	Unit-3 6/85 Unit-4 12/85	1/86 7/86

ANNEXURE-VIII (cont'd)

1.	2.	3.	4.	5.	6.		7
IV.	UTTAR PRADESH						
	1. Obra St.III (Unit 13)	2x110 (for unit 12,13)	15790 (for unit 12,13)	37600	Unit-13	6/78	3/82
	2. Parichha (Unit 1 and 2)	2x110	8372	15000	Unit-1	3/82	11/82
					Unit-2	9/82	6/83
	3. Anpara (Unit 1,2 & 3)	3x210	22710	47120	Unit-1	4/83	12/83
					Unit-2	10/83	6/84
					Unit-3	4/84	12/84
	4. Tande (Unit 1,2,3 and 4)	4x11	15925	27091	Unit-1	9/84	7/84
					Unit-2	4/84	12/84
					Unit-3	10/84	5/85
					Unit-4	3/85	9/85
	5. Unchahar (Unit 1 and 2)	2x210	19305	21958	Unit-1	12/85	12/85
					Unit-2	6/86	6/86
	6. Anpara 'B'	2x500	41610	57348	Unit-1	86-87	86-87
					Unit-2	87-88	87-88
V.	N.T.P.C.						
	1. Singrauli STPS St.1 (Unit 1,2, and 3)	3x210	25566 (for units 1,2 & 3)	31853 (for units 1,2 & 3)	Unit-2	6/82	12/82
					Unit-3	12/82	6/83
	2. Singrauli STPS St.II (Unit 4, 5,6 and 7)	2x210+ 2x500	49437	73217	Unit-4	6/83	12/83
					Unit-5	12/83	6/84
					Unit-6	12/84	1986-87
					Unit-7	12/85	1987-88

ANNEXURE-IX

DISTRICT-WISE POSITION OF AMOUNT SANCTIONED AND RELEASED AS ON 31-03-83
TRIPURA

SCHEME CODE	SCHEME NAME	CATEGORY	DATE OF SANCTION	AMOUNT SANCTIONED(RS)	AMOUNT RELEASED(RS)	INST CODE	INST DATE
1 NORTH TRIPURA							
190002	KAMALPUR ST	ST	19-06-80	71,31,000	71,31,000	2	3-02-83
190009	KAMALPORE	SU	24-12-82	53,53,500	12,00,000	1	31-03-83
190010	SALEMA	SU	24-12-82	38,21,700	10,00,000	1	31-03-83
199020	DHARAM NAGAR	MMNP	22-09-80	7,77,700	5,43,080	2	29-11-82
199021	KAMALPUR	MMNP	22-09-80	8,65,500	7,55,200	2	19-10-81
199022	DHARMNACAR	MMNP	4-03-81	13,71,400	9,22,500	2	21-09-82
199025	DHARAMNAGAR	MMNP	26-03-81	11,78,900	11,04,560	2	21-09-82
SUB TOTAL(NORMAL)				2,04,99,700	1,26,56,340		
199001	DHARAMNAGAR	MNP	25-01-75	78,96,900	78,96,900	5	30-03-81
199012	CHAMANU	RMNP	13-11-78	12,18,700	10,21,800	3	19-10-81
199013	KANCHANPUR	RMNP	13-11-78	24,25,100	13,49,700	2	19-10-81
199014	SALEMA-DAMBURNAGAR	RMNP	13-11-78	20,92,000	17,14,600	4	26-03-82
199015	MANU ST	RMNP	13-11-78	24,99,800	24,99,800	1	22-03-79
199016	PANISAGAR	RMNP	23-03-79	14,23,500	11,35,900	4	21-09-82
199017	KAILASHSAHAR	RMNP	17-05-79	18,83,800	14,16,700	3	21-09-82
SUB TOTAL (MNP)				1,94,39,900	1,70,35,400		
DISTRICT TOTAL 14				3,99,39,600	2,96,91,740		
2 SOUTH TRIPURA							
190001	BELONIA ST	ST	22-12-79	20,72,000	20,72,000	2	3-02-83
190004	SABROOM ST	ST	16-12-80	65,82,000	57,07,000	3	23-03-83
190007	BOGAFA	ST	12-01-82	11,19,800	5,49,900	1	31-03-82
190011	AMARPUR	SU	11-03-83	20,08,800	1,26,400	2	22-03-83
199018	RAJNAGAR	MMNP	4-02-80	12,93,600	10,42,100	2	29-11-82
199019	UDAIPUR	MMNP	12-03-80	9,30,000	4,38,600	2	22-01-82
199024	SABROOM	MMNP	26-03-81	13,93,700	6,52,300	2	22-03-82
SUB TOTAL(NORMAL)				1,53,99,900	1,05,88,300		
199002	UDAIPUR	MNP	29-11-75	76,10,900	63,23,500	4	18-01-82
199003	BALONIA	MNP	8-03-76	68,19,100	68,16,600	5	21-12-81
199005	TRIPURA-SW ST	MNP	31-01-77	54,90,400	54,79,400	2	18-01-82
199010	TRIPURA SOUTH ST	MNP	2-12-77	31,48,400	16,00,000	1	31-07-78
199028	BOGAFA	RMNP	29-07-82	18,89,300			- -
199029	RAJNAGAR MNP	RMNP	29-07-82	8,89,300			- -
SUB TOTAL (MNP)				2,58,47,400	2,02,19,500		
DISTRICT TOTAL 13				4,12,47,300	3,08,07,800		

ANNEXURE – X

QUARTERLY PROGRESS REPORT ON THE PHYSICAL ACHIEVEMENTS OF R.E.C. SCHEMES --- SERVICES
FOR QUARTER ENDING MAR 83 FINAL
BASED ON DATA RECEIVED UPTO 30-09-83

STATE ANDHRA PRADESH

SCHEME CODE	NAME OF SCHEME	QRT	CATO- GORY	LN IN SEPT82	PUMP SETS (NO)		L.T/AGRO (NO)		DOM/COMM. (NO)		ST.LIGHTS POINTS		OTHERS		NEW VILLAGES ELECTRIFIED	
					T	A	T	A	T	A	T	A	T	A	T	A
010120	HUZURNAGAR MFLI	183	MFLI	2	5			3								
010121	SATYAVEDU	183	OB	3	116	12	16	3	585	413	170	213			17	17
010122	TANDUR	183	OB	5	252	184	42	53	1100	709	780	722			71	70
010123	GHANAPUR	183	OB	5	720	1725	80	80	1694	1785	700	282		11	26	26
010126	MAKTHAL MF	183	MF	2	180	28		1	145	190	150	176			18	18
010132	CHINNAGOTTIGALLU	183	MF	2	200	182	5	3							2	2
010133	CHITTOOR MF	183	MF	2	379	473	5	1							7	7
010134	DHARMAVARAM	183	OB	4	540	690	18		1310	997	270	139			14	17
010135	KHANAPUR ME	482	ME	1			13	10	9	17						
010136	BODHAN PPA	481	PPC	2	330	251		1		204		16			13	13
10137	KUSHAIGUDA ME	183	ME	2			76	65	75	21						
					2962	3612	255	220	4918	4336	2070	1548			169	171
010151	SANGAREDDY	183	OB	5	200	203	24	27	1100	773	300	58			47	47
10152	ARMOOR	183	OA	5	1850	2942	30	40	1680	2664	500	524			13	13
10153	KALYANDURG	183	OB	4	720	951	23	40	1854	2783	900	341			22	26
010154	RAJAHMUNDRY	183	OA	4	274	643	41	241	806	4176	152	577			9	8
010155	PANHAMGADU	183	MI	2	20		34	4	110	171	70	108			4	4
010156	ADAVULADEEVI GC	183	MG	2	44	3	8	5	414	288	230	7		7	4	4
010160	CUDDAPPAH SPI	183	R12	2		568	21	5	79	872	30	170				24
010161	VISWESWARAM	183	MH	2	14	1	12	6	814	479	400	538		10	10	10
010162	HINDUPUR	183	OB	2	300	781	13	27	367	2107	150	164			16	14
010163	AMADALAVALASA PPA	282	PPC	2	160	1				54		33			13	6
010170	KANDAKUR	183	OB	3	360	35	39	10	2016	1113	498	534		16	60	64
010187	BANDAR	282	OA	4	32	7	36	12	1798	1845	800	2137			50	52
010195	KINTALI MH	482	MH	2	50	2	11	3	300	120	160	88			12	12
010196	MAHBOOBNAGAR SPD	482	RD1	2									17	14		
010197	VIKARABAD SPD	183	RD1	2		6		14	20	36	30	27	14		2	2
010198	WANAPAPTHY SPD	183	RD1	2				27					30			
010211	KATRAPADU MH	183	MH	2	15		27	12	187	1076	450	568		18	12	12
					4039	6143	319	473	12175	18557	4670	5874	61		274	298
010217	UDAYAGIRI	183	OB	3	407	174	27	4	1470	609	330	332		7	64	59
010219	ANANTHAGIRI	183	SU	2	6		4		38	49	38	96			24	32
010233	PONNUR MH	183	MH	2			9	1	242	26	120	65			4	4
010234	YELLAMANCHILLI MH	183	MH	2	70		19	3	440	320	275	265		21	9	9
010242	KAKINADA SPI	183	RI1	2			33	14	289	233	56	40		3		

ANNEXURE-XI

Maharashtra State Electricity Board, (O & M) Circle Latur

Progress Report on Physical Achievement of R. E. C. Schemes for the Quarter Ending June 83

1 Pin Code No. 110040
2 State , Maharashtra
3 District ; Beed
4 Name of Scheme: REC-II Beed

PHYSICAL PROGRESS

Sr. No	Description	Progress till last Quarter	During Current Quarter	Total
1	Villages covered (Nos)			
a)	Newly electrified Census Villages	76	-	76
b)	Already electrified census villages where additional load is envisaged.	-	-	-
c)	Hamlets electrified (if this is separately mentioned in the scheme report)	-	-	-
d)	No. of electrified Harijan Bastis forming part of (a & b) above.	-	-	-
2	H T Line (Kms)			
a)	22 KV Line and above.	-	-	-
b)	11 KV Main Line	157.45	-	157.45
c)	11 KV Replacement Line	-	-	-
	Total	157.45	-	157.45
3	L T Lines (Kms)			
a)	3 phase 5 wire Line	-	-	-
b)	3 phase 4 wire Line	210.93	-	210.93
c)	1 phase 3 wire Line	-	-	-
d)	1 phase 2 wire Line	-	-	-
	Total	210.93	-	210.93
4	Transformer Capacity			
a)	100 KVA --------	13	-	13
b)	63 KVA --------	19	-	19
c)	50 KVA --------	20	-	20
d)	25 KVA --------	28	-	28
	Total	70	-	70
5	Service connected (Nos)			
a)	Agricultural --------	774	-	774
b)	L. T / Agro Industrial ----	86	-	86
c)	Domestic / Commarical ---	959	-	959
d)	Street Light points ------	445	-	445
e)	Others ------------	-	-	-
	Total	2264	-	2264
6	Connected Load (kw)			
a)	Agricultural ---------	1167.78	-	1167.78
b)	L. T / Agro Industrial ---	638.09	-	638.09
c)	Domestic. Commercial ---	113.18	-	113.18
d)	Street Light points ------	17.8	-	17.8
e)	Other --------	[illegible]	-	[illegible]
	Total	1966.19	-	1966.19

RURAL ELECTRIFICATION CORPORATION LIMITED

ANNEXURE-XIII

Quarterly Progress Report on the Physical achievements of REC Schemes

State —

Name of Scheme —

District —

Category —

Class of Card 11 —
(Col 1-2)

REPORT FOR THE QUARTER 1-2 3-4 of 19

Col 11 Col 12-11

SCHEME CODE ☐☐☐☐☐☐

Col 5—10

Card Code Col (3-4)	Card Column	DESCRIPTION	Cumulative achievement as at the end of			
			March	June	September	December
01	14—18	New villages electrified (No)				
	19—23	33 KV Line (3+2)				
	24—28	11 KV Line (3+2)				
	29—33	TOTAL (3+2)				
	34—38	3φ5 Wire Line (3+2)				
	39—43	3φ4 Wire Line (3+2)				
	44—48	1φ3 Wire Line (3+2)				
	49—53	1φ2 Wire Line (3+2)				
	54—58	TOTAL (3+2)				
	59—63	630 KVA Trans Cap, (KVA)				
	64—68	1500 KVA Trans Cap (KVA)				
	69—73	3150 " "				
	74—78	5000 " "				
	79—80	Effective number of instt taken				
02	14—18	100 KVA trans Capacity (KVA)				
	19—23	63 KVA trans Capacity (KVA)				
	24—28	25 KVA trans Capacity (KVA)				
	29—33	Others (Specify)—(KVA)				
	34—38	TOTAL (KVA)				
	39—43	Agr Services connected (No) —Diesel to Elec				
	44—48	—do—New Connection (No)				
	49—53	LT/Agro Ind Services (No)				
	54—58	Domestic Services (No)				
	59—63	Commercial Services (No)				
	64—68	Street Light Points (No)				
	69—73	Others (No)				
	74—78	TOTAL (No)				
03	14—18	Agri Service—Load (kw)				
	19—23	LT/Agro Industry—Load (kw)				
	24—28	Domestic—load (kw)				
	29—33	Commercial—load (kw)				
	34—38	Street light points—load (kw)				
	39—43	Others—load (kw)				
	44—48	Total Connected load (kw)				
	49—53	Hash Total				

Master information to be punched in all cards

Col 1—2 Class of card (11) Col 3—4 card Code

Col 5—10 Scheme Code and Col 11—13 Quarter and year (Qyy)

Date on which latest ( ) instalment of loan was taken

Date of execution of documents (SPA Schemes only)

Coverage for village electrification (New villages)

No of services in "other" category

Target.

Card Code Col 3 4	Category	Unit	Physical Targets For					Total
		Cost	Iyr	IIyr	IIIyr	IVyr	Vyr	Target
	Card Column	11-18	19-26	27-34	35-42	43 50	51-58	59 -66
	HT LINES (Kms 8+8)							
12	33 KV Line							
13	11 KV Line							
14	11 KV Line Sevr							
	LT Line (Kms 8+2)							
15	3φ5							
16	3φ4							
17	1φ3							
18	1φ2							
19	Total							
	TRANSFORMERS (Capacity [illegible])							
20	33/11 KV 630 KVA							
21	1600 KVA							
22	3150 KVA							
23	5000 KVA							
24	11/0.4 KV 25 KVA							
25	63 KVA							
26	100 KVA							
27	Others							
28	Total							
	SERVICES (Nos 8+0)							
29	Agriculture							
30	Industry							
31	Domestic							
32	Commercial							
33	Street lights							
34	Others							
35	Total							
36	LT CAPACITORS (KVAR)							
	EXPECTED REVENUE (Rs)([illegible])							
37	From Power Supply	N A						
38	Misc	N A						
	VILLAGE COVERAGE (8+0)							
39	Virgin	N A						
40	Electrified	N A						
	COST DATA (8 3)							
41	Cost of Power	N A						
42	Cost of Scheme	N A						
43	Loan AMT Due	N A						
44	Capital Base	N A						
45	[illegible] Value	N A						
46	Overhead Costs	N A						
47	Subsidy	N A						
48	[illegible] Capitalisation	N A						
49	Cost of Power at [illegible] KV (Paise/KWH)							
53	[illegible]							
4	[illegible] Rest [illegible] and							
55	[illegible] Cost of Energy							
56	Total Discounted Net [illegible]							
57	Total Discounted Economic benefit							

MATERIAL REQUIREMENTS

Card Code	Card Column	Category	Qty.
50		**33/11KV TRANSFORMER (Nos.)**	
	11-13	630 KVA	☐☐☐
	14-16	1600 KVA	☐☐☐
	17-19	3150 KVA	☐☐☐
	20-22	5000 KVA	☐☐☐
		11KV CIRCUIT BREAKERS (Nos)	
	23-28	Minimum Oil	☐☐☐☐☐☐
	29-34	Bulk Oil	☐☐☐☐☐☐
	35-40	Air Break	☐☐☐☐☐☐
		METRES (Nos)	
	41-46	2.5—5.0 Amps 1φ	☐☐☐☐☐☐
	47-52	10—20 Amps 1φ	☐☐☐☐☐☐
	53-58	10 Amps 3φ	☐☐☐☐☐☐
	59-64	30 Amps 3φ	☐☐☐☐☐☐
		DISTRIBUTION TRANSFORMERS (Nos)	
	65-68	25 KVA	☐☐☐☐
	69-72	63 KVA	☐☐☐☐
	73-76	100 KVA	☐☐☐☐
		CONDUCTORS (Km)	
51	11-16	25 mm² AAC (Gnat)	☐☐☐☐☐☐
	17-22	50 mm² AAC (Ant)	☐☐☐☐☐☐
	23-28	20 mm² ACSR (Squirrel)	☐☐☐☐☐☐
	29-34	30 mm² ACSR (Weasel)	☐☐☐☐☐☐
	35-40	50 mm² ACSR (Rabbit)	☐☐☐☐☐☐
	41-46	80 mm² ACSR (Racoon)	☐☐☐☐☐☐
	47-52	100 mm² ACSR (Dog)	☐☐☐☐☐☐
		INSULATOR (Nos)	
	53-60	11 KV Pin	☐☐☐☐☐☐☐☐
	61-68	11 KV Strain	☐☐☐☐☐☐☐☐
	69-77	LT Pin	☐☐☐☐☐☐☐☐☐
52	11 8	LT Shackle	☐☐☐☐☐☐☐☐☐
		LT CAPACITOR (Nos)	
	19-24	1 KVAR (3.5 HP)	☐☐☐☐☐☐
	25-30	2 KVAR (5 HP)	☐☐☐☐☐☐
	31-36	3 KVAR (7.5 HP)	☐☐☐☐☐☐
	37-42	4 KVAR (10 HP & Above)	☐☐☐☐☐☐
		POLES (Nos)	
	43-48	7.5 metres—Wood	☐☐☐☐☐☐
	49-54	—RCC	☐☐☐☐☐☐
	55-60	—PCC	☐☐☐☐☐☐
	61-66	—Rail	☐☐☐☐☐☐
	67-72	8.0 metres—Wood	☐☐☐☐☐☐
	73-78	—RCC	☐☐☐☐☐☐
		—PCC	☐☐☐☐☐☐
		—Rail	☐☐☐☐☐☐

MASTER DATA FOR SANCTIONED SCHEMES

CLASS OF CARD- 10
(Col 1--2)

Card Code (3–4)	Card Column		
0 1	5–10	Scheme Code	
	11–45	Scheme Name	(35 Characters)
	46–47	Type of Scheme	
	48–49	District Code	
	50–69	Blocks Covered	
	70–75	Sanction Date	
0 2	11–17	Population	
	18–25	Total Cost of Scheme	☐☐☐☐☐☐☐☐
	26–33	Total Loan Sanctioned	☐☐☐☐☐☐☐☐
	34–41	Existing Assets Value	☐☐☐☐☐☐☐☐
	42–49	Consumers Contribution	☐☐☐☐☐☐☐☐
	50–57	Contribution by SEB/GVT	☐☐☐☐☐☐☐☐
	58–63	Existing No of Irrigation Wells	☐☐☐☐☐☐
	64–69	No of Existing Pump Set.—Diesel	☐☐☐☐☐☐
	70–75	—Electrified	☐☐☐☐☐☐
0 3	11–16	Expected Area of Agricultural Land To come under Irrigation (00 Hect)	☐☐☐☐☐☐
	17–18	Scheme Period	☐☐
	19–20	Lead Bank Code	☐☐
		Is the project covered by	
	21–21	(i) World Bank Loan	Yes/No/N A
	22–22	(ii) MFAL/SFDA IRDP	Yes/No/N A
	23–23	(iii) TDA	Yes/No/N A
	24–24	(iv) Project Classified as Hill Area '	Yes/No N A
	25–25	(v) DPAP	Yes/No/N A
	26–26	(vi) RIP DIC	Yes/No N A
	27–27	(vii) IADP	Yes No N A
	28–28	(viii) Dry Farming	Yes No N A
	29–29	(ix) NABARD	Yes No N A
	30–30	(x)	Yes No N A
	31–31	(xi)	Yes/No N A
	32–32	(xii) Project Classified as ' Tribal'	Yes No N A
	33–33	(xiii) Project Classified as 'Backward '	Yes No N A
		(Punch 1 for Yes 0 for No and 2 for N A)	

Master information to be punched on all Cards Class of Card (10) Col 1—2, Card Code in Col 3-4 and Scheme Code in Col 5- 10

P T C

ANNEXURE-XV (cont'd)

TARIFF AND LOAD DISTRIBUTION

Card Code	Category	Utilisation Hrs annum	Consumer Contribution per connection	Existing		After Project Completion		
				No of Conn	Load in kw	Av Tariff Rate kwh	Proposed load in kw	Gross Revenue
	Card Column	11–14 4–0	15–19 (5+0)	20–25 (6–0)	26–31 (6–0)	32 36 (3 2)	37 42 (6 0)	43–48 (3–3) lakhs
04	Agriculture							
05	L T Industry							
06	Agro Industry							
07	Domestic							
08	Commercial							
09	Street Lights							
10	Misc							
11	Over all							

58

FOR SPA SCHEMES ONLY

Name of participating Bank (abbreviate) ☐☐☐☐☐☐

Bank code (numeric) ☐☐

Date of execution of documents ☐☐☐☐☐☐

Loan amount sanctioned by Bank ☐☐☐☐☐☐☐☐

FOR ALL SCHEMES

Economic Rate of Return ☐☐ Net present ☐☐☐☐☐

☐☐ Value (3+2) ☐☐☐☐☐

ANNEXURE - XVI

NTPC

SITE PROGRESS REPORT (Ramagundam Super Thermal Station)

Sl No.	ACTIVITY DESCRIPTION	SCH/ACT.ANTCPD DATE		TOTAL QUAN-	CUMULATIVE PRO- GRESS TILL		PROGRESS FOR THE MONTH		SCH/TARGET FOR THE NEXT MONTH
		START	FINISH		SCHEDULE	ACTUAL	SCH/ TARG	ACTUAL	
1.	2	3	4	5	6	7	8	9	10
1.0	MAIN PLANT								
1.1	POWER HOUSE FOUNDATIONS								
1.2	MAIN PLANT GENERAL CIVIL WORKS								
1.3	MAIN PLANT EQUIPMENT ERECTION								
1.3.1	Erection								
1.4	R.C.C. STACK								
2.1	WATER TREATMENT PLANT								
3.0	C.W. SYSTEM PART - 1								
3.1	R.C.C.								
3.2	COOLING TOWERS								

1	2	3	4	5	6	7	8	9	10
4.0	C.W.SYSTEM PART - II								
4.1	EARTH DAM								
4.2	MASENRY DAM								
5.0	COAL HANDLING PLANT (MECHANICAL)								
6.0	MERRY GO ROUND SYSTEM (TRACK)								
7.0	FUEL OIL HANDLING (MECHANICAL)								
8.2.0	ASH HANDLING (CIVIL)								
8.2.1	ASH DISPOSAL DYKE								
9.1.0	STATION PIPING								
10.0	A/C & VENTILATION								
11.0	FIRE FIGHTING SYSTEM								
12.0	CABLE ERECTION								
13.0	STATION LIGHTING								
14.0	PERMANENT TOWNSHIP								

ANNEXURE - XVII

NTPC

SITE PROGRESS REPORT

WATER TREATMENT PLANT DEC' 83
M/S. DRIPLEX

25.01.83 to 25.12.83

Sl. No.	DESCRIPTION OF WORK	SCH/ACT.ANTCPD DATE		TOTAL QUANTITY	PROGRESS Till 25.12.83
		START	FINISH		
1.	Clarified bridge-II	-- 12.03.83	-- --	Complete work	Mech.erection work is completed in all respects. MCC has been erected and cable connections are to be done.
2.	Chemical House	-- 01.09.83	-- 05.11.83	Complete work	Lime dosing & Alum dosing systems have been commissioned. Coagulant aid solution dozing system will be commissioned as soon as the elect.rectification work is completed.
3.	Chlorine House	--	--	Complete work	Mech.erection work is mostly completed. System will be commissioned by 10.01.84.
4.	Chlorination Plant	-- 26.11.83	-- 25.01.84	Complete work	Erection of chlorinators, chlorinator booster pumps and roller supports completed. Piping work and mono rail beam erection works are under progress.

ANNEXURE - XVIII

SSTPS UNIT - I (Jan.84)

Date	Generation (MU)	Availability (%)	Plant Load Factor (%)	Sp. Oil Cons. (ml/kwh)	Aux. Cons. (%)	Make up Water (%)	No. of Unit out-ages	Heat Rate
1.1.84	4.125	100	85.9	5.33	9.04	2.68	-	2383
2.1.84	3.980	100	82.9	4.52	9.26	2.66	-	2449
3.1.84	3.869	100	80.6	-	9.5	2.68	-	2445
4.1.84	4.064	100	84.6	-	9.27	2.68	-	2467
5-1-84	4.398	100	91.6	-	8.74	2.68	-	2432
6-1-84	3.591	83.5	74.8	8.91	10.58	3.27	1	2522
7-1-84	4.582	100	95.4	-	9.79	2.74	-	2436
8-1-84	4.617	100	96.1	2.16	9.91	2.80	-	2403
9-1-84	4.595	100	95.7	1.06	9.87	2.80	-	2404
10-1-84	4.614	100	96.12	-	9.93	2.8	-	2422
11-1-84	4.519	100	94.1	-	9.6	2.8	-	2421
12-1-84	4.642	100	96.7	-	8.5	2.8	-	2396
13-1-84	4.558	100	94.9	0.877	8.72	2.8	-	2445
14-1-84	3.805	100	79.2	-	9.38	2.8	-	2478
15-1-84	4.404	100	91.7	-	8.58	2.8	-	2436
16-1-84	4.373	100	91.1	-	8.70	2.83	-	2456
17-1-84	4.170	100	86.88	0.719	9.17	2.86	-	2487
18-1-84	4.342	100	90.46	0.690	9.46	2.86	-	2422
19-1-84	4.639	100	96.65	Nil	8.29	2.86	-	2406
20-1-84	4.647	100	96.81	Nil	8.37	2.86	-	2409
21-1-84	4.690	100	97.21	-	8.34	2.80	-	2364
22-1-84	4.567	100	95.56	3.052	8.48	2.86	-	2474
23-1-84	4.553	100	94.85	Nil	8.5	2.86	-	2446
24-1-84	4.608	100	96	-	8.46	2.86	-	2376
25-1-84	4.556	100	94.92	-	8.29	2.86	-	2491
26-1-84	2.944	67.5	61.33	14.95	10.31	3.05	1	-
27-1-84	------PLANNED SHUT DOWN------------------------------							
28-1-84			-do-					
29-1-84			-do-					
30-1-84			-do-					
31-1-84			-do-					
TOTAL								

ANNEXURE - XIX

NTPC - SINGRAULI SUPER THERMAL STATION - PERFORMANCE OF UNIT-I

S. NO	DESCRIPTION	APRIL'82	MAY'82	JUNE'82	JULY'82	AUG '82	SEPT'82	OCT'82	NOV'82	DEC'82	JAN'83	FEB'83	MAR83
1.	Generation (MU)	45 62	48 73	123 16	129 68	114 72	112 31	35 647	67 026	122.671	116.641	15 53	146.581
2	Aux. Power consumption	20 7	17 67	11.88	11 75	11.59	9.35	12 27	12 7	8 87	8 9	15.84	8.52
3.	Sp oil consumption (ml/kwh)	18 02	18.02	3 523	6 05	12.34	4 49	5.1	12 9	2.315	1.13	29.04	0 57
	Sp coal consumption (kg/kwh)	0 538	0 629	0.56	0.537	0.545	0 538	0.526	0 538	0 516	0 504	0.547	0.512
	Availability %	70	49 88	97.6	92.65	85.63	79.92	25 33	58.1	86.17	81.07	12.76	98.16
	Utilisation factor (%)	31 68	32.75	85.5	87.15	77.09	78	23.95	46 54	82.44	78.38	11.55	98.51
	Plant load factor(%)	45.15	65 65	87.63	94.06	90.03	97.6	94.57	80 09	95.67	96.69	90.55	100.35
8.	Unit gross heat rate (kcal/kwh)	3454	3028	2924	2731	2838	2764	2685	2900	2633	2556	3034	2535
9	Make-up water (% MCR)	7.91	9 78	8 86	6.48	6.12	3.99	4.43	3.59	3.16	2 51	12.73	2.20
10	No. of Trippings(nos)	24	7	5	6	10	6	2	3	1	3	2	4
11	Overall efficiency(%)	25 2	28 4	29.4	31 49	30.37	31.1	32.03	29.65	32 66	33.65	28.34	33 92
12	Specific fuel cost (P/kwh)	37.15	17 75	11 89	12 24	14.356	11.77	11.73	14.39	10.68	10.08		-

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GR565